ENVIRONMENTAL SECURITY IN THE DANUBE RIVER BASIN: POLICY IMPLICATIONS FOR THE UNITED STATES

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The views expressed in this report are those of the author and do not necessarily reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

The research for this project was completed in late 1998. Consequently, this paper does not attempt to address the environmental consequences of the recent armed conflict in Kosovo, nor the impacts resulting from the air campaign which accelerated an end to the hostilities.

A number of assertions have been made concerned with the long-term impact of the conflict on the environment. One preliminary assessment, carried out by the Regional Environmental Center for Central and Eastern Europe and contracted experts, found no significant evidence of any large-scale ecological catastrophe, but expressed concern over pollution associated with targeted industrial complexes and operations of refugee camps on water ecosystems.

It is premature to offer comment, owing to a lack of concrete data and study predating the conflict. The United Nations Environmental Programme and Centre for Human Settlements jointly formed a Balkans Task Force that has been conducting independent and scientific assessments of the impact of the most recent armed conflict on the environment. Pending the findings in the task force's final report, further research may be required to reassess the major regional environmental security issues and policy responses identified in this paper.

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EXECUTIVE SUMMARY

> *"A coordinated approach to solving environmental problems in Central and Eastern European countries may stimulate their economic and political cooperation, as well as reduce the risks of conflicts."* (1994 Report on Strategic Environmental Issues in Central and Eastern Europe, The Regional Environmental Center)

The Danube River is one of world's longest and busiest rivers. With over 30 of its tributaries navigable, it has long been crucial to the culture and economy of Central and Eastern Europe. It comprises an important aquatic ecosystem, draining 8 percent of Europe's land mass and supporting some 86 million people. Flowing through more countries than any other river on earth, the Danube eventually discharges into the Black Sea. The river also serves as a national border between several countries. This region's resources have been a key strategic objective for imperial aspirations over the centuries. The volatility of the area has served as a catalyst for one major world war earlier this century that enveloped the European continent. North Atlantic Treaty Organization (NATO) military forces are currently deployed in what may be a long peacekeeping role in the Balkans.

Danubian nations have been making substantial progress in restructuring their economic and political systems following the Cold War. Environmental challenges remain a legacy of half a century under totalitarian regimes. International, European, and American institutions have been actively supportive of ongoing regional economic transition. Economic development will generate the funding to pay for the upgrading of existing infrastructure and newer and more efficient environmental and energy systems that are capable of meeting higher Western performance standards. These improvements are required for these countries to successfully compete in the European, and other regional and global markets. Stable democracies and economies in Central and Eastern Europe are vital to the interests of the United States. In addition to economic restructuring and transition, there are a number of other environmental security issues believed likely to have an impact on future regional stability.

The Danube serves as a critical resource for water and hydroelectric power, and is the only access to the sea for Austria, the Czech Republic, Slovakia, and Hungary. The importance of the inland water system has increased with the recent completion of the Main-Danube Canal that now links both the North and Black Seas and which can now accommodate the larger Euro-barges, affording a more cost-effective and less polluting means of transport. However, expanded use has significant regional environmental consequences. The controversial Gabcikovo-Nagymaros hydroelectric dam project on the Danube energized public protests in the late 1980s that contributed to the downfall of the totalitarian regimes in both Hungary and the former Czechoslovakia.

The European Union has completed two recent assessments of environmental problems on the continent. No serious pollution problems, excepting a technological or natural disaster, are believed likely to cause large-scale damage or loss of life. The region is also heavily reliant upon polluting solid fuels and Soviet-designed nuclear reactors. Bulgarian and Slovakian nuclear reactors are major sources of public debate and interstate friction. Existing Soviet-designed reactors are of international concern and several nuclear safety initiatives are underway to support many of the Danubian nations in major upgrades and operational improvements. Degradation of air quality in the Danube basin is a problem

directly associated with regional energy needs. Many countries are faced with continuing to use readily available and cheaper fossil fuels than becoming overly dependent on cleaner Russian natural gas.

Ethnic conflict in the Balkans has resulted in hundreds of thousands of deaths and displaced persons, creating a significant refugee problem. The conflict also saw the deliberate and needless destruction of both industry and infrastructure, resulting in pollution throughout several sub-basins of the Danube. Regional demographics are also becoming increasing in more important as the rate of population growth declines and life expectancies increase, given that aging populations are generally more susceptible to infectious disease.

A regional approach is being used to address the restoration and protection of the Danube River. A permanent organizational structure under an International Commission for the Protection of the Danube River has recently been established with final ratification of the Danube Convention. An environmental program office has been functioning for over seven years, developing a strategic action plan and coordinating related national and regional activities. A similar ecogeographical approach is also being successfully applied for the Black Sea.

Ongoing and planned initiatives by international and regional institutions should be appropriately coordinated through the existing Environmental Programme for the Danube River Basin to better leverage existing capabilities and assets and to avoid duplication of effort. United States efforts should be focused, under State Department leadership, employing a coordinated interagency approach.

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Tables and Figures

1. ACRONYMS

AEPI	Army Environmental Policy Institute
AMEC	Arctic Military Environmental Cooperation
BSEP	Black Sea Environmental Program
CEE	Central Eastern Europe
CEI	Central European Initiative
DANIS	Danube Information System
DDRDI	Danube Delta Research and Design Institute
DEMDSS	Danube Emissions Management Decision Support System
DoD	Department of Defense
DoE	Department of Energy
DPCU	Danube Programme Coordination Unit
DPRP	Danube Pollution Reduction Programme
EAP	Environmental Action Plan
EAPC	Euro-Atlantic Partnership Council
EBRD	European Bank for Reconstruction and Development
EEA	European Environmental Agency
EPA	Environmental Protection Agency (U.S.)
EPDRB	Environmental Programme for the Danube River Basin
EU	European Union
FSU	Former Soviet Union
GEF	Global Environmental Facility
GIS	Geographical Information System
IAEA	International Atomic Energy Agency
ICJ	International Court of Justice
IDA	International Development Association
ICPDR	International Commission for the Protection of the Danube River
IEMTF	Interagency Ecosystem Management Task Force
IIASA	International Institute for Applied Systems Analysis
IMF	International Monetary Fund
INSS	Institute for National Security Studies
MOU	Memorandum of Understanding
NAPs	National Action Plans
NATO	North Atlantic Treaty Organization
NGOs	Non-Government Organizations
OECD	Organization for Economic Co-operation and Development
PfP	Partnership for Peace
REC	Regional Environmental Center
SAIC	Science Applications International Corporation
SECI	Southeast European Cooperative Initiative
SIP	Strategic Action Plan Implementation Program
UNEP	United Nations Environmental Program
USEUCOM	United States European Command
WWFN	World Wide Fund for Nature

2. INTRODUCTION

This paper examines the environmental security issues having the most likely potential to impact stability within the Danube River Basin, and recommends areas for future policy consideration and emphasis. Knowledge of such issues allows for a more proactive and better coordinated response in helping to ensure that U.S. national interests in the region are protected.

Major Objectives of the Paper

The specific research objectives of this paper were to:

1. Describe the general environmental condition and stressors in the Danube River Basin and identify major environmental security issues most likely to pose the greatest threats both to regional stability and U.S. national interests;

2. Review existing cooperative initiatives to restore and manage this valuable ecosystem by international, regional, and national institutions, non-government organizations, and the U.S.;

3. Review how U.S. capabilities and assets might be used to address priority environmental security issues;

4. Review specific cases where environmental conditions are believed to have contributed to conflict.

5. Conduct a preliminary assessment of available modeling software to determine its usefulness in predicting situations where potential conflict might erupt and where proactive involvement by the U.S. would be advantageous in disarming the situation.

6. Develop several case studies as representative of environmental security issues that have led, or could easily lead, to increased instability within the region for further examination in appropriate curriculums involving environmental policy and security studies.

Methodology Employed

This paper was prepared using a variety of different information collection methods, to include an exhaustive literature review conducted in both the United States and Europe of several major universities, research centers, and regional organizations having interests in Central and Eastern Europe (CEE). Interviews were also conducted of key officials of the Environmental Programme for the Danube River Basin and regional Non-Government Organizations (NGOs). A survey was developed in accordance with appropriate practices (Babbie, 1990), that was used primarily in the interviews, as well as being sent to targeted individuals not available for interviews.

A brief group exercise was conducted at the NATO School in Oberammergau , Germany that was incorporated into an ongoing two-week environmental course regularly offered to NATO and Central and Eastern European officers, noncommissioned officers and civilians working related environmental programs within their respective military organizations. Four separate work groups were established based on affiliation with the Danube River Basin. Each group was requested to provide a consen-

sus ran-ordered listing of the major environmental issues or stressors they believe are confronting the basin. A more detailed discussion of the group exercise is provided at Appendix C.

Chapter Focus

The following provides a synopsis of what will be covered in each of the chapters and the specific research questions addressed.

Chapter 3 introduces the term "environmental security," reviewing the development of the concept, and the ongoing debate as to its definition and usage and implications to national security. Several simple paradigms are offered to visualize the complex interaction among factors impacting national and regional stability. The application of the concept by several key government agencies is presented. An "ecogeographical" approach is suggested as a means for fostering comprehensive regional security.

Chapter 4 provides an overview of the physical, historical, and cultural factors impacting regional development. This development is shown to have been influenced by both Western and Eastern civilizations over the centuries. Cultural and historical fault lines will be introduced as a means for better understanding the current Balkan ethnic unrest. An overview is provided of the major environmental problems confronting the nations, of the Danube [addresses research question 1].

Chapter 5 provides a detailed review of environmental security issues having the potential to impact regional stability. Foremost among these issues is the ongoing economic transition in CEE after decades of environmental neglect under centrally planned economies. The CEE region remains dependent upon pollution-generating solid fuels and Soviet-designed nuclear power plants. Options available in the pursuit of energy self-sufficiency will be examined. This chapter also reviews the environmental and security considerations associated with the expanded use of the 4,300 kilometers of inland waters in the Danube River Basin. The environmental consequences associated with ethnic conflict will be briefly discussed. Regional demographics are examined, focusing on the security implications that increasing life expectancies and immigration policies will have on many nations and the region. Finally, three case studies are presented as representative of regional environmental security issues [addresses research questions 1,4, and 6].

Chapter 6 will examine efforts taken by both international and regional institutions in addressing the environmental security issues identified in Chapter 5. The structure, capabilities, and expertise of these institutions will be briefly highlighted. This review is important in identifying areas where additional emphasis or coordination is needed [addresses research question 2].

Chapter 7 summarizes some of the major conclusions made in the prior chapters and recommends areas for future policy considerations and emphasis. A common observation is the need for more focused and coordinated efforts by many regional institutions and the U.S. [addresses research question 3].

Appendix A provides an expanded discussion on the development of socio-economic and environmental indicators that have been widely used as a means of influencing public policy. However, environmental indicators are a relatively new and often controversial area, with many international institutions conducting pioneering work to develop consistent indicators and aggregated indices that can be more easily communicated [addresses research question 5].

Appendix B provides a preliminary assessment of environmental decision support systems. An integrated, or hybrid, Geographic Information System (GIS) and Decision Support System (DSS) is proposed as incorporating the best of both a simulation and graphics packet. Such approaches are becoming increasing more affordable and practical with the exponential growth in automation technology [addresses research question 5].

Appendix C presents the results of a group exercise on environmental security in the Danube River Basin conducted on 20 July 1998. The class exercise involved some 40 international students during a regularly scheduled two-week NATO environmental course. The students were broken into four preassigned work groups. A summary is presented of the major environmental issues and stressors identified by each of the work groups.

3. ENVIRONMENT AND SECURITY

The environment has only recently taken a more prominent position in United States national security deliberations and planning. A new term "environmental security" has emerged, its definition and usage still much debated. This chapter provides an overview of the development of this concept and presents several simplistic paradigms to illustrate what is actually a complex linkage of social, economic, political, and environmental effects, and how their interaction might lead to instability. Also discussed are how several key U.S. government departments and agencies have defined and incorporated the concept into their operations, as well as their respective capabilities and expertise. The final section of the chapter makes a strong argument for addressing environmental security on an ecogeographical basis, with the Danube River Basin recommended as a natural unit for fostering comprehensive regional security in Central and Eastern Europe.

3.1 Redefining Security

The end of the Cold War has introduced a new set of emerging transnational phenomena that will increasingly effect international stability. Many of the assumptions and institutions that have governed international relations in the past are a poor fit in today's realities, suggesting a redefinition of what constitutes national security (Mathews, 1989). National security has traditionally been defined in excessively narrow and militaristic terms (Ullman, 1983), prompting the introduction of the concept of "world security." It recognizes than many new emerging perils may transcend the capabilities of nations to act in a unilateral and self-interested fashion against external threats to survival (Klare and Thomas, 1994).

Globally, non-military threats such as environmental degradation and rapid population growth will have important long-term security implications that will become increasingly difficult to ignore. It has also been suggested that interstate conflict over territory will likely be surpassed by a competition over resources (Ullman, 1983). While such issues have been met in the past with skepticism or boredom in foreign policy circles, and treated as low politics, it is hypothesized that the environment will be a major national security issue well into the next century (Kaplan, 1994). Gleick (1991) recommends that environmental security "challenge the monopoly that political and military security analysts have exercised on interstate politics," and that an effort be made to better understand the connection between environment and security.

Deudney (1990) takes a different view, believing the exploration of such links are a means to exact new missions for security organizations following the end of the Soviet threat, and does not believe that environmental degradation is likely to lead to interstate conflict. Rather, the world is believed more resilient, that it can weather significant environmental disruption without resorting to interstate conflict. Further, the potential for resource wars may be diminishing because nation states also find it increasingly difficult and costly to exploit foreign resources through territorial conquest. Historic tensions and conflicts over nonrenewable mineral and energy resources may also be diminishing with stronger world trade markets, better able to provide alternative sources or substitutes (Gleick, 1991).

Environmental security has been offered as a term to redefine national security to encompass resource and environmental threats. A broad interpretation of environmental security views severe environmental degradation and stressors as presenting a security threat as serious as war. Those supporting a narrower definition focus on the protection of national (domestic) resources from both external and internal environmental threats and disasters. The term has been used more recently by researchers to address the link between environmental scarcity, exacerbated by demographic change, and violent conflict. It has also been viewed from the reverse perspective of how violent conflict might negatively impact the environment. Yet another variant considers environmental security as protection from ecoterrorism.

The role of the environment in national security policy remains the subject of lively debate and, thus, no single definition has yet to receive widespread general acceptance. Several institutions have been created to address this relatively new concept. One example is the Environmental Change and Security Project (ECSP), established at the Woodrow Wilson International Center for Scholars in 1994. Its stated mission is to promote increased dialogue and scholarly debate on the topic of environment, population, and security through discussion group meetings, conferences, and publications. The ECSP publishes an annual report on its activities and maintains a comprehensive bibliographic guide to the literature.

3.2 Evolving Paradigms

Current research efforts have attempted to assist with the ongoing debate on how best to address the environment in national security policy. Much of this research has focused on the "linkages" between social, economic, political, and environmental effects and how their interaction might lead to increased national or regional instability and conflict. The causal relationships have important consequences to decision makers considering how and when to intervene to resolve a conflict in its the early stages before they escalate to a point where the use of military force becomes more likely.

The inability of United Nation organizations and other institutions to cope with increases in international environmental conflicts (IEC), and an apparent academic "gap" in related research, prompted Trolldalen (1992) to develop a conceptual, theoretical, and empirical framework for IEC evaluation. Trolldalen recognized that nations had developed different ways of managing competition for natural resource utilization and responding to the effects of "environmental degradation." He suggests that the global interdependence of many environmental issues indicates they can no longer be managed from a single national center.

Trolldalen (1992) introduces a simplified model portraying what is actually a rather complex escalation pattern of an IEC. The vertical axis of the escalation model depicts four increasing levels (phases) of polarization: incipient, latent, acknowledged, and overt conflict. The horizontal axis depicts the passage of time. The transition between phases is suggested to be more continuous than discrete. The number of parties involved in the conflict tends to increase as the conflict escalates and becomes more polarized, often escalating from a local conflict to one with more regional or global ramifications. Preventive measures are appropriate in the incipient phase. Specialized organizations may achieve success at both the incipient and latent phases. If no attempt is made to prevent or avoid the IEC, it can easily escalate to an interim settlement (acknowledged) phase, or lead to violent conflict.

Trolldalen (1992) introduces a complementary paradigm he terms a Systemic Environmental Conflict (SEC) model in which environmental, economic, and socio-political aspects can be integrated. This model, reportedly, demonstrates how the demand created by human consumption of natural resources between two adversarial parties is an essential driving force behind IECs. The model is offered as a predictive tool, but no specifics are provided. Rather, a further simplified "ABC model" is used to reflect how the natural resources base results in further externalities, or negative environmental side effects. This model is used to review four possible forms of conflicts through different case studies.

Application of this model is made to an international river system where competition for both quality and quantity of water has the potential to lead to conflict that is shared between two or more riparian nations. Reportedly, there are some 200 such large river systems (Trolldalen, 1992). A comparative summary of some of the major European rivers is given in Table 3.1 (Page 22). The Danube itself flows through more countries than any other river on earth (World Wide Fund for Nature, 1998), each placing conflicting demands upon it as a major natural resource providing water, navigation, and hydroelectric power. A simplistic representation of the Danube system using the ABC model is depicted in Figure 3.1 (Page 23).

The Project on Environment, Population and Security (EPS) at the University of Toronto's Peace and Conflict Studies Program has done pioneering work since the early 1990s, investigating the complex relationship between environmental scarcities of renewable resources and violent conflict in developing countries (Homer-Dixon, 1996a). This research made a distinction between renewable and nonrenewable resources, and limited itself to violent conflict, since it is easier to identify and measure. Renewable resource scarcity occurs from degradation or depletion, increased consumption, and uneven distribution. The Project used empirical data to evaluate case studies on Mexico, Pakistan, Rwanda, and South Africa. The term "security" has typically been avoided in articles by Homer-Dixon, given its broad interpretation and the potential to be misunderstood. A simplified schematic of the factors whose interaction may lead to a form of instability or conflict is shown in Figure 3.2 (Page 24).

The Project's research suggests that environmental scarcity is generally never the sole cause of conflict, but interacts with other socio-economic and political factors to precipitate civil strife and social disruptions (Homer-Dixon, 1996a). Environmental scarcity can easily lead powerful groups to capture valuable resources (resource capture) while forcing marginal groups to migrate to areas less able to sustain them (ecological migration). There is also little empirical support for an earlier hypothesis that environmental scarcity of renewable resources causes simple-scarcity conflicts or (resource wars) between states (Homer-Dixon, 1994). Homer-Dixon (1996b) proposes that researchers and policy makers consider all three major sources of environmental scarcity (Figure 3.2, Page 24), rather than continuing to focus solely on "environmental degradation."

Of 12 conflicts in this century studied by Westing (1986, as presented in Homer-Dixon, 1994), ten involved access to oil or minerals, while only five can be attributable to renewable resources. Of these five, the 1969 Soccer War between El Salvador and Honduras was primarily a result of cropland dispute and land distribution, to the detriment of poor farmers, and the 1972-1973 Anglo-Icelandic Cod War involved very little violence. Homer-Dixon (1994) attributes the focus on conflict over nonrenewable resources, primarily oil and minerals, to their relative importance to an industrialized and militarized nation. Poorer nations dependent on renewable resources are typically not in the best position to conduct a resource war on neighboring states.

Table 3.1 - Comparison of Major European Watersheds

Characteristic	Danube	Volga	Dnieper	Rhine-Maas
Watershed Area (000 km2)	796	1484	502	199
Countries in Watershed (a)	13	2	3	8
Pop. Density per sq.km.	103.5	41.4	67	304.1
Land Use:				
Cropland (percent)	66.5	59.2	85.4	64.2
Forest (percent)	20.4	23	3	7.2
Developed (percent)	11.3	10.3	9.8	26.2
Original Forest (percent)	63.1	53	77.6	71
Arid Area (percent)	2.6	18.6	3.6	0
Wetland Area (percent)	1.4	2.6	6.2	1
Protected Area (percent)	6.6	1.1	1.2	18
Number of Ramsar Sites (b)	47	3	0	20
Nutrient Concentration:				
Nitrate (mg/l)		0.62	0.2	3.88
Phosphate (mg/l)	0.1	0.02	0.01	0.4

Notes:

a. Excludes countries have <1% area in the watershed

b. Wetlands of international importance

Source:

World Resources 1998-1999 - A Guide to the Global Environment, 1998, Oxford University Press, copyright 1998 WRI, data tables adapted by permission of World Resources Institute (WRI)

Figure 3.1 - ABC Model: River System

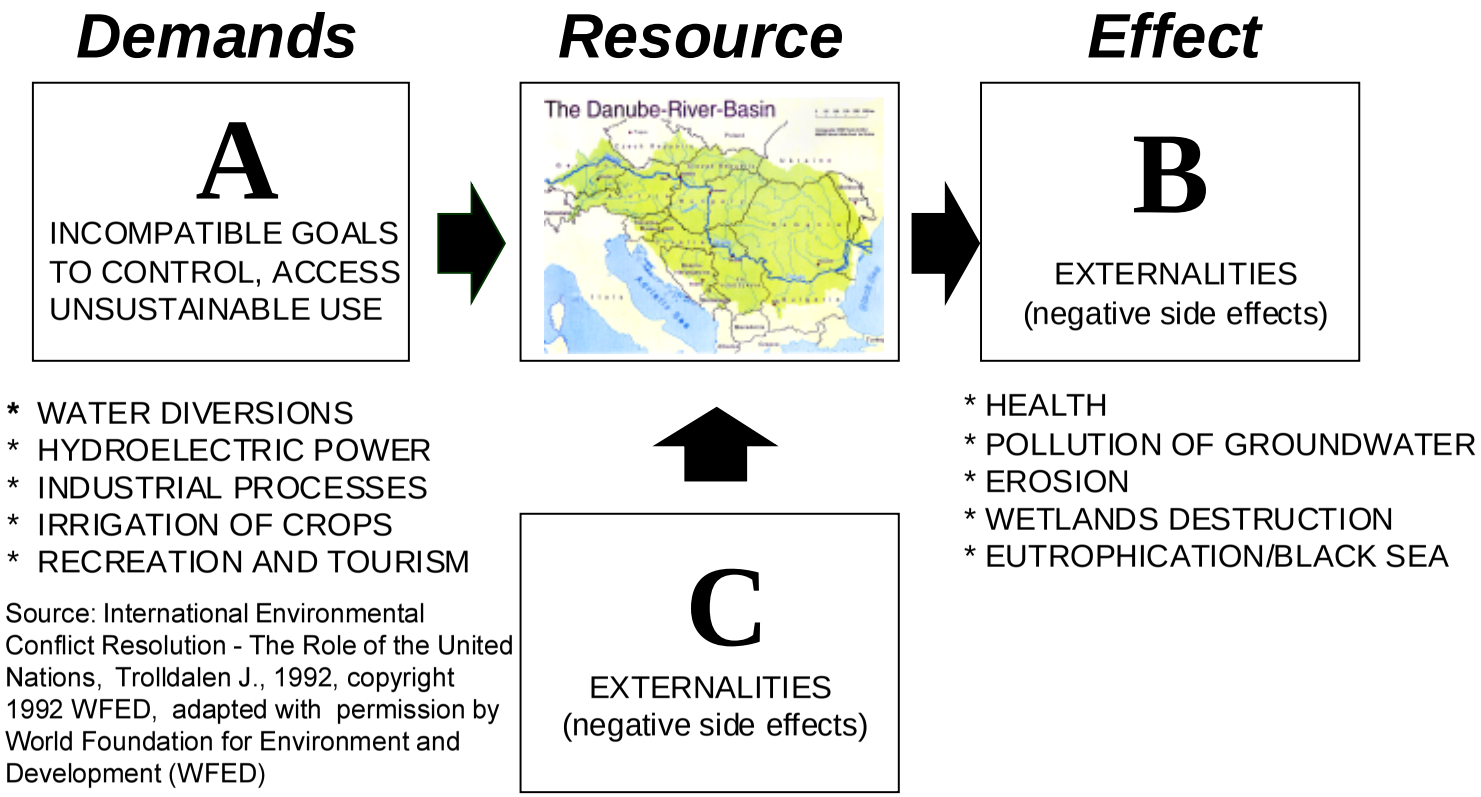
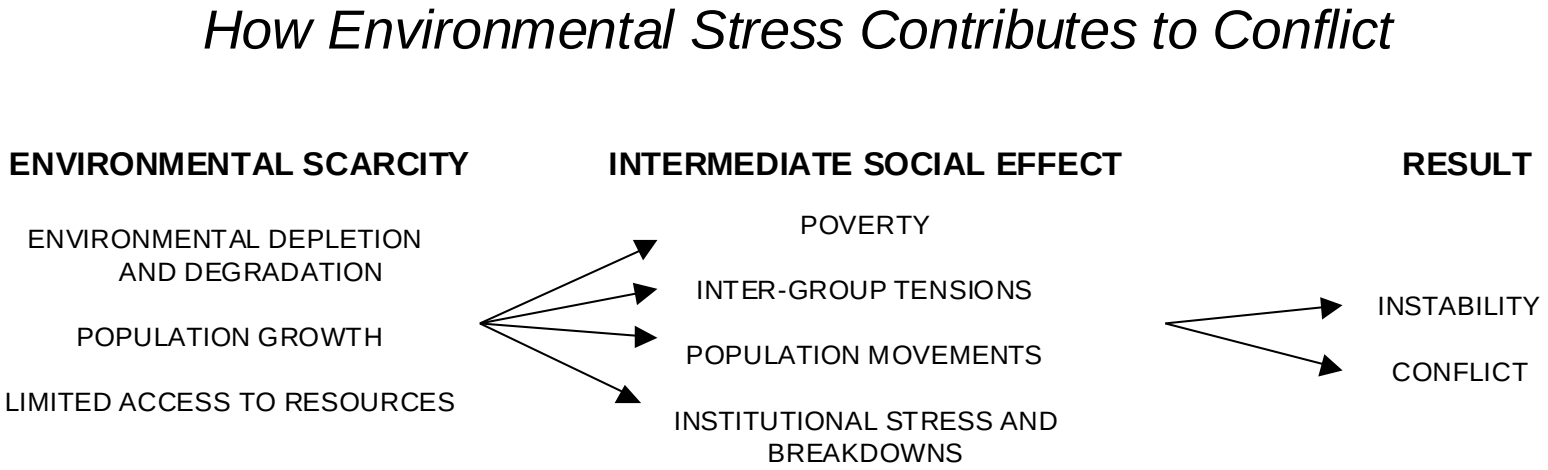
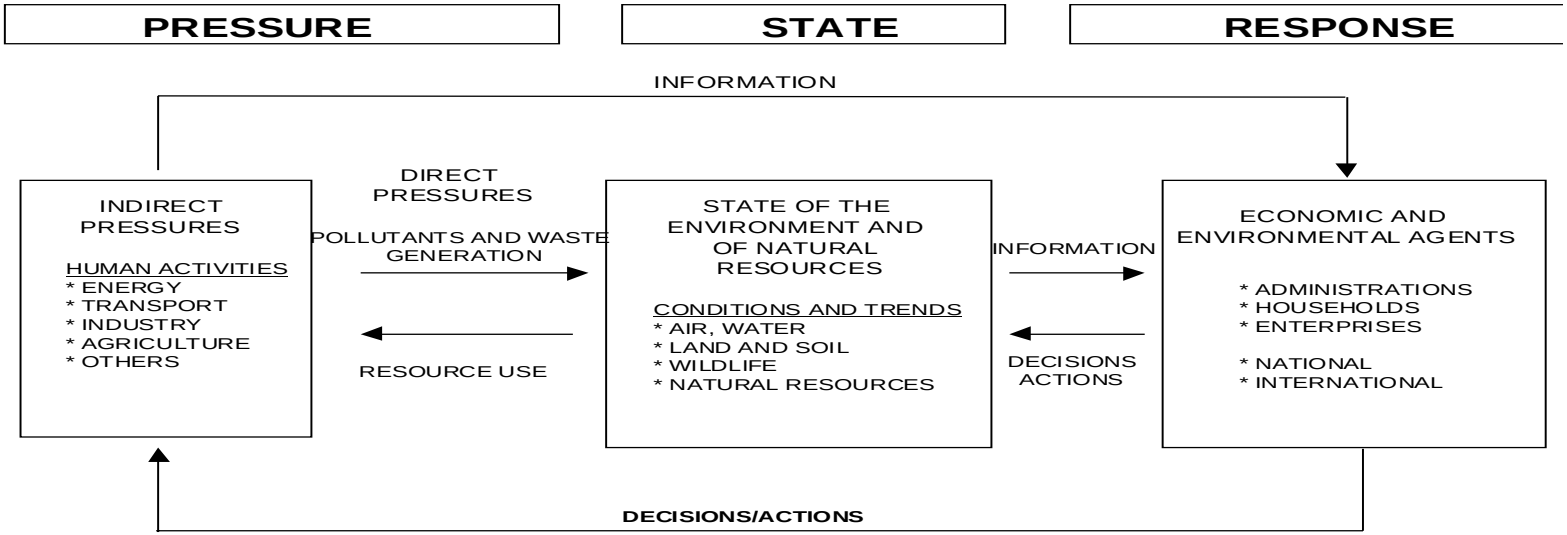


Figure 3.2 - Environmental Scarcity Model



Source: The Project on Environmental, Population and Security: Key Findings of Research, Homer-Dixon, 1996, Environmental Change and Security Project Report, Issue 2, Spring 1996:45-48, the Woodrow Wilson Center, Smithsonian, reproduced with permission of Professor Thomas Homer-Dixon.

Figure 3.3- Pressure-State Response Model



Source: Towards Sustainable Development - Environmental Indicators, 1998, OECD Publications, copyright OECD 1998 reproduced by permission of the Organization for Economic Co-operation and Development (OECD)

Several researchers have concluded that, should an interstate resource war occur, it will most likely be over "river water" given its importance to the national survival of so many developing nations and because it can be so easily impacted by upstream riparian nations (Homer-Dixon, 1994 and Gleick, 1993). The majority of water-limited nations are located in Africa and Asia, however, several CEE nations (e.g., Hungary, Bulgaria, and Romania) face water availability issues (Gleick, 1993), an issue addressed again later in the paper.

A pressure-state-response (PSR) model that employs a causal framework has been under development by the Organization for Economic Co-operation and Development (OECD), in association with a core set of environmental indicators. This effort was based on earlier work by the Canadian government (Hammond et. al, 1995). The PSR model (Figure 3.3, Page 25) is helpful to the decision maker in better understanding the links between human activities that exert pressure on the state of the environment, and societal response. However, it should be understood that the actual relationships between the environment and other socio-economic and political factors are very complex (OECD, 1998c). A more extensive discussion of both the PSR model and environmental indicators is provided in Appendix A.

3.3 Refocusing of Mission

The importance of the major environmental threats has found an increasingly prevalent status in U.S. national security planning. The realization that many threats are transboundary, heeding no national border, and can pose long-term problems is highlighted in the U.S. National Security Strategy (White House, 1997). In advancing U.S. national interests the Strategy restates the constitutional mandate that American lives will be protected at home and abroad, the sovereignty of the country will be maintained, and the well being of the nation and its people will be provided for.

The Strategy also stresses as the imperative of engagement, the need for the United States to exert global leadership, using available resources, to influence the actions of other nations. America's prosperity is tied closely to that of Europe. Thus the Strategy seeks to focus environmental technical assistance and expertise on those Central and Eastern (CEE) countries that have "suffered the most acute environmental crisis". In response, the current administration has been active in establishing and implementing environmental security programs and initiatives within its departments and agencies involved in international activities.

Environmental Diplomacy

In a 1996 keynote address at Stanford University, then-Secretary of State Warren Christopher announced a new policy realignment for his Department, stressing the role of diplomacy in addressing environmental quality and resource protection (Christopher, 1996). He emphasized the need for the State Department, "as the flagship institution of America's foreign policy....to spearhead a government-wide effort to meet...environmental challenges." He recommended that the Department and other agencies pursue environmental priorities on four levels: globally, regionally, bilaterally, and in partnership with Non-Governmental Organizations (NGOs) and private businesses. Building stable markets in both the former Soviet Union and Central Europe was viewed as critical to reinforcing the security of the United States.

Current Secretary Madeleine Albright remains committed that "America should be the world's environmental leader," given that "environmental degradation...is a real threat to our (U.S.) national security" (Albright, 1994). In April 1997, the Department released its first annual report on the environment with future reports to be released every year on Earth Day (State Department, 1997). The annual report entitled "Environmental Diplomacy" outlines the Department's priorities in tackling increasingly complex environmental issues in water resources, air quality, energy resources, land use, and urban and industrial growth. Improvement of Soviet-designed nuclear reactors also remains a high priority issue for CEE.

Preventive Defense

The U.S. Department of Defense (DoD) has defined its environmental security mission as "assuring that DoD missions are performed in an environmentally responsible, safe and healthful manner, that environmental threats that could lead to internal instability are deterred and, when appropriate, that DoD assets are applied to mitigate environmental effects of natural or man-made disasters (DoD, undated and 1993)."

The term environmental security has recently been defined in DoD environmental policies as: "a program that enhances readiness by institutionalizing the Department of Defense's environmental, safety, and occupational health awareness, making it an integral part of the Department's daily activities. Environmental Security is comprised of cleanup, compliance, conservation, pollution prevention, safety, occupational health, explosives safety, fire and emergency services, pest management, environmental security technology, and international activities" (DoD, 1996a and 1996b).

Given a refocusing of mission, the Department reorganized in 1993, creating a new position of Deputy Under Secretary of Defense for Environmental Security, to fulfill four major goals:

- to comply with the law;
- to support military readiness of the U.S. armed forces by ensuing continued access to the air, land, and water needed for training and testing;
- to improve the quality of life for military personnel and their families by protecting them from environmental, safety, and health hazards and maintaining quality military facilities, and;
- to contribute to weapons systems that have improved performance, lower cost, and better environmental characteristics (DoD, 1998a).

U.S. national security is dependent upon preventing the conditions that lead to interstate conflict and help create the conditions for peace. Former Secretary of Defense William Perry, in a 1996 speech to Harvard's John F. Kennedy School of Government, coined the strategic concept of "preventive defense" (Perry, 1996). At the heart of this concept is the pursuit of the underlying causes of conflict and instability, obtaining adequate warning of potential crises, and acting well before a crisis to avoid costly military interventions. Preventive defense is viewed as providing the United States its first line of defense, deterrence its second, with military force being used only as a last resort.

Environmental security is viewed as a tool for preventive defense. It provides another avenue by which to engage and influence the militaries of other nations by helping these militaries to enhance their environmental awareness and build the organizational capacity necessary to minimize their impact on the environment. In doing so, it has the potential to contribute to building democracy, trust, and

understanding. The challenges of how and where to focus the DoD's efforts in environmental cooperation, and how and where environmental degradation and scarcity are likely to lead to instability, constitute what has been termed the "environmental security pillar" of preventive defense (Goodman, 1996).

The Department and its Services have unique organizational, logistical, technical, and intelligence capabilities and assets which make it a logical choice to execute U.S. environmental security missions (Butts, 1993a and 1994). DoD's main environmental security focus areas have been in the life cycle of weapons systems acquisition; partnerships with States, tribal nations, and private citizens; and international activities involving environmental security cooperative initiatives with the militaries of other nations. DoD's environmental cooperative initiatives with the North Atlantic Treaty Organization (NATO) are reviewed later in the report.

Beyond Nuclear Safety

The Department of Energy (DoE) not only possesses unique capabilities solely in the energy sector, but also has at its disposal a diverse laboratory system that has made significant scientific and technological achievements across a broad spectrum of disciplines to include national security policy. The DoE views environmental security well within its scope of mission and interests in analysis, research, and testing; hazardous and radioactive waste remediation; nuclear safety in the decommissioning of facilities and safe handling of nuclear materials and wastes; and infrastructure development in power generation, energy efficient distribution systems, and waste treatment (Haspel, 1998).

Reportedly, the DoE views environmental security through three filters, evaluating: the presence of a significance environmental stressor; the relative contribution of the stressor to regional instability; and the relative strategic importance of the region to the United States (Berry, 1997). The DoE is currently active in a number of regional environmental cooperative activities with other U.S. and foreign agencies in the Baltics, Russian Arctic, and CEE, where these criteria have been met. The Department has been very active in the establishment of a safety program to reduce the risks associated with Soviet-designed nuclear reactors (Center for Environmental Security (CES), 1998).

Emphasis on Pollution Prevention

The U.S. Environmental Protection Agency (EPA) views environmental security as "the minimization of environmental trends or conditions involving other countries that could, over time, have significant negative impacts on important U.S. national interests" (Nitze, 1997). EPA is developing and implementing a program envisioned to proactively support U.S. efforts to manage environmental threats comprising five elements:

- anticipating future environmental and national security concerns;
- addressing regional environmental threats and enhancing regional security; abating global environmental effects;
- managing conditions resulting from the legacy of the Cold War; and ensuring compliance with international treaties and elimination of environmental crimes (Hecht, 1998).

In Central Eastern Europe, the EPA was instrumental in opening a Regional Environmental Center (REC) in Budapest in 1990, following the fall of the Berlin Wall. The EPA, under a grant from the U.S. Agency for International Development, has also been active in providing technical assistance to Central Eastern European countries on a variety of different environmental problems, especially those related to air and water pollution. It has been working with the European Union in addressing long-range transboundary pollution on the continent, and in establishing pollution prevention centers in the Czech Republic and Poland (EPA, 1998).

Enviro-Intelligence

The U.S. Central Intelligence Agency (CIA) advises the President and National Security Council on intelligence matters of national security. The CIA has at its disposal a broad spectrum of classified information that has been acquired by both human and technical collectors as well as open-source information. The latter sources have grown exponentially with that of the Internet. The CIA had analyzed environmental issues at the request of policy makers and consumers from various levels within the U.S. government to include, on a case-by-case basis, the impact of the environment on the political and socio-economic stability of other nations and regions. This information has already been used to monitor compliance with international treaties.

The collapse of the Soviet Union as a global power has dramatically altered U.S. national security policy and brought into question the value of espionage agencies in a new more open era. Several legislators leveled sharp criticism at the intelligence community, primarily the CIA for failing to predict the demise of the Soviet Union, raising the possibility that some intelligence duties should be transferred to other departments such as the State Department (Johnson, 1992).

Much of this criticism might have been triggered by the fear of uncertainty relating to future and yet unknown threats confronting the U.S. beyond global proliferation of nuclear, biological, and chemical weapons, and the worldwide flow of conventional armament. In response, President Bush signed National Security Review No. 29 in 1991. It directed the intelligence agencies to compile an exhaustive list of priorities that would go beyond their traditional discussions and focus on such issues as ethnic and territorial disputes and the intentional spread of pathogens that could destabilize foreign governments (Johnson, 1992).

A major weakness with many international environmental conventions and protocols is a lack of effective monitoring and enforcement. Consequently, it has been recommended that the U.S. and other nations share their aerial and satellite imagery data more generously with the United Nations and with the private sector as a whole (Johnson, 1992). The U.S. and Russia recently met to trade unclassified data from their respective Cold War reconnaissance imaging satellites, the CIA providing photos on the Siberian forests in exchange for similar imaging on America's Alaskan forests (Auster, 1998).

The Department of Defense intelligence capabilities are also showing promise for use by environmental scientists. The Navy's integrated undersea-surveillance system (IUSS), designed to detect enemy submarines, was unveiled earlier and made available to civilian scientists (Economist, 1994). The system has already been used by one researcher to track a blue whale's movements from Cape Cod to Bermuda during a 43-day period. This and other technology may assist in detecting the sound of harpoons from "treaty-breaking whalers" and the emptying of bilges from illegal chemical dumping in the seas.

The DoD has also exhibited strong leadership in planning for and promoting a two-day Environmental Security/National Security Conference in mid-1995, which was co-hosted with the intelligence community. This was considered a pivotal point in helping to frame the role of the intelligence community in supporting related policy deliberations on how environmental issues might impact national security.

The continued realization of the importance between environment and national security has led to the relatively recent establishment of the Director of Central Intelligence (DCI) Environmental Center (e.g., DEC). This new center's focus will be on environmental challenges that have a direct impact to U.S. interests (Auster, 1998). The DEC sponsored a three-day workshop of regional environmental experts in November 1997 to explore likely "environmental flash points" throughout the major regions of the world. The more important workshop findings that relate to the European region are discussed further in Chapter 5.

Leveraging Resources

Acting on the current administration's belief that a strong international program is crucial to U.S. security, economic, and health interest, the DoD, the DoE, and the EPA signed a Memorandum of Understanding (MOU) in July 1996 calling for partnerships between these agencies, other governments, and industry to jointly address critical environmental concerns. The need for such an agreement grew out of a mutual frustration among agencies desiring to leverage their unique expertise and resources to more efficiently address areas of similar interest on an international front (Vest, 1997), a TEAM USA concept for interagency partnership (EPA, 1998).

This MOU calls for a focused integration of government authorities, expertise and resources on environmental priorities, and also establishes a framework for cooperation in several areas. The initial emphasis will be on programs to enhance environmental cooperation between the U.S. and foreign partners to include the Baltic states, Russia, Eastern Europe, and the newly independent states of the former Soviet Union. Focus areas include: information exchange, research and development, technology transfer, regulatory reform, emergency response training, and environmental management.

The EPA and DoE, at the invitation of DoD, have been active participants on an ongoing trilateral initiative with Russia and Norway on Arctic Military Environmental Cooperation (AMEC). The AMEC focuses on military-related environmental issues impacting the Russian Arctic, to include improved management of radioactive and other hazardous materials. This is reportedly one of the foremost successes of the MOU, and expansion of this partnership to include other U.S. government agencies will be promoted once more experience is gained (Vest, 1997). The State Department is an active participant on AMEC and other regional environmental cooperative initiatives, although it is not currently a signatory to the underlying MOU.

There has also been a growing interest by the current administration to further concentrate efforts in promoting economic and environmental cooperation in Southeast Europe. This is due, in large part, to the relative volatility of this particular area. The socio-economic, political, and environmental issues contributing to this volatility will be discussed later in the paper.

3.4 Ecogeographical Approach

An ecogeographical approach to environmental security is also a relatively new concept (or paradigm) that encourages a broader view involving increased regional collaboration among key actors and stakeholder (Interagency Ecosystem Management Task Force (IEMTF), 1995). Westing (1989a) defines an ecogeographical region as an ecosystem or "unit made up of living and non-living components of the environment that interact to form a life-support system." This definition denotes a region that functions in a relatively cohesive and independent manner. This should not imply, however, that an ecogeographical region is totally self-contained and independent of other contiguous areas, or that its boundaries are easily distinguishable.

Ecosystem boundaries do not necessarily correspond well to the artificial boundaries imposed by the political borders of most modern nation states. Rather, physical and natural characteristics of climate and topography, biological communities, and cultural and social forces are suggested as better determinants (Caldwell, 1970, Westing, 1989b, and Byers, 1991). The complexity and dynamics associated with ethnicity, religion, and language make it particularly difficult to identify culturally determined regions and subregions (Westing, 1989b). Byers argues that understanding the incongruities between political ecogeographical borders can provide a better basis for understanding conflict.

The concept of organized nation states is relatively new, ushered into prominence only after the Peace of Westphalia in 1648 (Kaplan, 1994). Until the twentieth century, nation states only comprised three percent of the earth's land area. While most scholars do not believe cultural identities will soon replace existing nations states, transnational societal and environmental stresses are believed to have already initiated a breakdown of the boundaries of national sovereignty (Mathews, 1989). An important struggle for national identity is occurring in Russia, where Western European principles are at odds with a historic desire to remain a unique Eurasian civilization (Huntington, 1993).

Some modification to state sovereignty has been recommended as necessary to prevent ecologically-based conflict (Byers, 1991). International agreements on transboundary environmental problems are viewed as a beginning. Resistance to the ecosystem approach has stemmed from the fear that public land policies are but a "thinly veiled attempt" by the government to take over the management of private lands (IEMTF, 1995), suggesting that "all land is in some degree public" (Caldwell, 1970). The complexity of ecosystems has been offered as a more practical argument against the development of ecosystem-based land policies. It is doubtful that such policies would be any more complicated than current land ownership policies and laws (Caldwell, 1970). Advantages in applying ecosystem criteria include a holistic emphasis in thinking and the application of science in resolving disputes using administrative, versus litigious means.

Hardin (1985) makes a strong argument that one should "never globalize a problem if it can be dealt with locally," suggesting that globalization of environmental problems may actually be counterproductive. Since these problems are produced by local action the responsibility for their solution should be retained at the local level. Global air pollution is offered as one example where global solutions and institutions are warranted, but where limited sovereignty required to successfully control pollutants is believed unlikely to be given from nation states because of rational fears over the potential abuse of such power. Dilution in national sovereignty, however, is inevitable in establishing international treaties and interstate federations to address regional environmental problems (Westing, 1989b).

The European Union exemplifies the pursuit of regional economic and political security at the expense of the surrendering of limited national sovereignty by member states.

Since most conflict occurs among neighboring countries, it is suggested that regional cooperation on transboundary environmental problems will have the added benefit of fostering comprehensive regional security (Westing, 1989b). Several justifications are offered for this perspective. Regional issues are generally more clearly defined than are global issues and may offer unique solutions. The ecogeographical region is also likely to be "endowed with an ecological integrity that most nations could not achieve short of conquest." A regional approach to environmental cooperation presents opportunities for promoting a peaceful model for addressing disputes on common transboundary problems that can be easily transferred to other issues.

A river basin approach has been growing steadily in popularity as a natural unit for addressing water quality management efforts within CEE (Scheierling, 1996). Ecosystem approaches have been successfully applied internationally, as in the case of the Rhine River (Murphy, 1997a) and Great Lakes (EPA, 1990 and IEMTF, 1995). A watershed approach is being used successfully by the United States to restore and protect water quality in several major water bodies, including the Chesapeake Bay. In a recent empirical survey of integrated river basin management agencies conducted by the Organization for Economic Co-operation and Development, there has been a noticeably strong movement away from purely economic approaches to river basin management towards the resolution of environmental problems (Newson, 1997).

The Danube River Basin comprises a multitude of nation states with differing languages, religions, and ethnic groups. As will be discussed later, the concept of cultural gradient to define Europe's regions has been shown to be inconclusive, leaving one to ponder if it would be safer to use a physical and geographical categorization (Davies, 1996). This has advantages, especially since the natural components of a hydrologic unit remain constant, while political regimes have typically been unstable and short lived. The Danube River affords an important and common cultural link that has bound the region historically (Magris, 1997 and Kaplan, 1996) and could easily be exploited to improve regional environmental security (Westing, 1989b).